Diversified Farming Systems in Northern Region of West Bengal: An Empirical Study.

SYNOPISIS OF THE THESIS

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1. INTRODUCTION

Indian agriculture has been diversifying from cereals to high value crops and livestock products in accordance with the changing consumption pattern in favour of livestock, fruits and vegetables. A sustained economic growth, rising per capita income and growing urbanization are causing a shift in the consumption patterns in favor of high-value food commodities like fruits, vegetables, dairy, poultry, meat and fish products from staple food such as rice, wheat and coarse cereals. Such a shift in consumption patterns in favor of high-value food commodities depicts an on-going process of agricultural diversification (Haque *et, al.* 2010). The concept of diversification remains incomplete and subdued if it is not supported by the diversified farming systems (DFS) Om *et al*. (2008). In such diversified farming, though crop and other enterprises coexist. DFS as farming practices and landscapes that intentionally include a mix of different farm enterprises in which farm families allocate resources for efficient utilization of the existing enterprises for enhancing productivity and profitability of the farm. These farm enterprises are crop, livestock, aquaculture, agro-forestry, agri-horticulture, etc. (Kremen *et al.*, 2012).

West Bengal as being one among the important diversifying agricultural states in India, having more than 65% of the population engaged in agriculture & allied sectors is primarily an agrarian state. It is the sixth largest contributor to the country's GDP, which is attributed to agriculture and the allied sector. Its portion of agricultural land is amongst the highest of all Indian states (Economic Survey of India, 2011-12). In an overall agricultural scenario of West Bengal, there is a diminishing trend in acreage and production of major crops with the change in time. Gradually, there has been a change in the cropping pattern in favour of high value crops like boro paddy, potatoes, vegetables, fruits, etc. against pulses, coarse cereals and sugarcane in the last two decades i.e. since the beginning of the nineties (De & Chattopadhyay 2010, Ghosh, 2010). Farmers are now interested in short duration high value cash crops like summer and winter vegetables (bhendi, cucurbitaceous vegetables, tomato, brinjal, chilli) to generate income in the farm family to raise their overall livelihood. Progressive farmers are shifted to high value vegetable and fruit based cropping system from the traditional rice based system and also diversifying more within the allied sectors like livestock and fisheries (Chatterjee & Ray 2013). Hence, they ought to have other enterprises to supplement their farm income, employment and other farm/home requirements. The major concern of the state is now to increase the growth rate of agriculture and allied sectors particularly to enhance agricultural productivity in the state (Anonymous, 2009).

Farming systems in northern regions of West Bengal is heavily diversifying towards vegetable based farming system followed by dairy and plantation based systems, marginal and small

farmers' dominant in hill zone has adopted diversified farming system apart from growing traditional cereal crops and the terai zone is dominated by conventional cereal-based farming systems, followed by vegetable based sub-system, and jute based systems with its vast agricultural field and forest area coverage, and very limited studies have been carried out in the region (Ray *et al.*, 2012). Agricultural activities are dominated mainly by small and marginal farmers (95%) with average size of holding being 0.44 ha (Som, 2005). Relatively high rate of illiteracy, higher concentration of SC/ST population, small size of holding and poor resource bases are the characteristic feature of this region. Fragmentation of holdings continues to remain at an increasing rate which indicates prevalence of huge number resource-poor agricultural farming communities (Economic survey of West Bengal, 2011-12). Despite of having natural advantages in the production of good number of fruits, vegetables, flowers, some of the food grain crops, oilseeds and pulses, the farmers are mostly inclined to retain their traditional cropping pattern due to unique socio-economic conditions in hilly and terai/dooars region (Subba *et al.*, 2015).

KEY WORDS: Agricultural Diversification, Agriculture & Allied sector, Diversified Farming Systems, Northern Region, West Bengal.

Hence the present attempt is envisaging studying "Diversified Farming Systems in northern region of West Bengal: An empirical study" with the following objectives.

1. To study differential socio-economic profile of the farmers practizing different types of farming.

2. To explore the different types of diversified farming systems in northern region of West Bengal.

3. To study the level of awareness and adoption of diversified farming systems.

4. To ascertain the impact of agricultural diversification on farm output and farmers' livelihood.

5. To examine the advantages and limitations in practising diversified farming.

IMPORTANCE OF THE STUDY

The concept of diversification remains incomplete and subdued if it is not supported by the diversified farming systems. Om *et al*., (2008). DFS depends on the willingness and capacity of farmers to diversify their farms, but they need support and incentives to help survive the risks of changing from conventional to alternative production practices and to work together more

collaboratively at the landscape level (Iles & Marsh 2012). The average size of holdings of small and marginal farmers in India is so low that it cannot generate adequate employment and income for their sustenance, based on crop cultivation only. This is particularly true if the farmers use only traditional technology having local, low yielding plant varieties and low value subsistence crops and if they do not undertake other farm and non-farm activities including horticulture, sericulture, animal husbandry, fishing, agro-forestry, agro-processing, agro-services etc. Such glaring income disparities between agricultural and non-agricultural households must be removed through appropriate policy changes for horizontal as well as vertical diversification in rural areas (Haque, 2010). It is in the interest of both individual small farmers and the nation as a whole to plan for horizontal diversification within agriculture as well as vertical diversification, involving income earning activities by small farms outside agriculture. This is intended not only to liberate the small and marginal farmers from the poverty trap, but also to meet the country's growing demands for fruits, vegetables, milk and milk products, meat, fish, eggs etc. Moreover, the study will assume great significance in creating database for realistic planning and implementation of future diversified farming systems approach. Findings will also serve as a bench mark for future appropriate policy changes for horizontal as well as vertical diversification. .

The study will also guide future researchers in understanding many aspects relevant to differential socio-economic profile of the farmers practicing different types of farming. Also, it will provide a full insight into the impact of agriculture diversification in farm output and farmers livelihood, level of awareness/adoption of DFS, level of satisfaction of farmers along with the factors associated with and the advantages/limitation faced by the farmers in obtaining diversified farming.

2 REVIEW OF LITERATURE:

Zhang *et al*. (2007) findings of the study had referred farming system as “diversified” when it intentionally includes functional biodiversity at multiple spatial and/or temporal scales, through practices developed via traditional and/or agro ecological scientific knowledge.

De & Chattopadhyay (2010) study on crop diversification by poor peasants and role of infrastructure: Evidence from West Bengal. The empirical results as presented reveal that crop diversification in West Bengal have been persisting since 1970. The value of diversification index has increased though not at a very faster rate, but reallocation of land towards a few crops has been taking place continuously.

Ghosh (2010) study on “Essence of crop diversification: A study of West Bengal agriculture during 1970 - 1971 to 2004 – 2005” had pointed out that in the last two decades i.e. since the

beginning of the nineties there has been a gradual change in the cropping pattern in favour of high value crops like boro paddy, potatoes, vegetables, fruits, etc. against pulses, coarse cereals and sugarcane.

Torane *et al*. (2011) findings had revealed that out of the total farming systems in the study area, 52% have been found as the diversified farming systems. Also, the area which is nearer to the sea coast has shown higher diversification than the area away from the sea coast.

Kremen *et al*. (2012) findings had explored to what extent diversified farming systems (DFS) overlap or are differentiated from existing concepts such as sustainable, multi functional, organic or eco agriculture.

Iles and Marsh (2012) findings of the study had concluded diversified farming systems depends on the willingness and capacity of farmers to diversify their farms, but they need support and incentives to help survive the risks of changing from conventional to alternative production practices and to work together more collaboratively at the landscape level.

Khatun and Roy (2012) in their study conducted in the state of West Bengal had shown that household-head experience(age), educational level, social status, training, asset position, access to credit, rural infrastructure, agro climatic condition and the overall level of economic development of a region are the main driving force towards livelihood diversification in the state.

Bacon *et al*. (2012) findings of the study had illustrated that diversified farming system are interdependent with a set of institutional environments that specifically promote diversified farming practices and that enhance the social benefits of sustainable agriculture.

Bowman and Zilberman (2013) research findings had concluded that the expansion and adoption of DFS is limited by a number of factors, including still-limited demand for products produced via DFS, supply-side constraints such as high costs of tilling or harvest in multiple crop systems, and policies such as subsidies and crop insurance which discourage diversification.

Chatterjee *et al*. (2015) had identified four distinct farm types, namely, farms growing food grain and jute, farms with animal husbandry and fishery based diversification with high off-farm income, farms with crop based diversification with off-farm income, and farms growing vegetables and fruits and also concluded that farm type identification and characterization based on estimates of income from different farm components allows simplifying diversity in farming systems.

3. RESEARCH METHODOLOGY

The details of the research methods are explained and presented under the following heads:

3.1. Sampling procedure

3.2. Selection of variables and their measurement

3.3. Techniques of Data Collection

3.4. Data analysis

3.1 Sampling Procedure:

The northern region of West Bengal will be purposively select i.e. hilly and terai regions of the state, as the major area of these regions represents different types of agro climatic, farming systems and socio economic livelihood conditions respectively. The selection of the district, block and villages will be based on stratified random sampling. And in case of selection of respondent's, twenty farmers representing different categories from each village covering to a total sample of 320 respondents will be taken up through simple random technique. The equality in the sample from both regions will made in order to create a suitable base for comparison process.

State	Districts	RD blocks	Villages	Respondents	Total sample size	Sampling procedure
West Bengal	D1	B1	2	40	320	Stratified random sampling
		B2	2	40		
	D2	B1	2	40		
		B2	2	40		
	D3	B1	2	40		
		B2	2	40		
	D4	B1	2	40		
		B2	2	40		

3.2 Variables and their measurements:

The variables will be selected based on the objectives of present study. A brief detail of the variables considered in present study and their measurement procedures is given below.

Variables		Measurement
Socio-personal		
1	Age	On the basis of chronological age at the time of investigation
2	Sex	Categorized as male and female
3	Education level	Scale developed by Pareek and Trivedi (1964)
4	Family size	Scale developed by Pareek and Trivedi (1964)
5	Occupation	Structured schedule will be developed
Socio -economic		
1	Size of land holdings	Structured schedule will be developed
2	Leased in land	Structured schedule will be developed
3	Leased out land	Structured schedule will be developed
4	Fragmented land	Structured schedule will be developed
5	Indebtedness	Structured schedule will be developed
6	Annual yield	Structured schedule will be developed
7	Cropping intensity	Structured schedule will be developed
8	Farm resource available	Structured schedule will be developed
9	Farming practices	Structured schedule will be developed
10	Farm types	Structured schedule will be developed
11	Irrigation status	Structured schedule will be developed
12	Annual income, income from agriculture/farming	Structured schedule will be developed
13	Communicational profile	Scale developed by Singh (1972)

Socio- psychological		
1	Economic motivation	Scale developed by Maulik (1965)
2	Innovation Proneness	Scale developed by Maulik & Rao (1965)
3	Independency	Scale developed by Supe (1969)
4	Risk orientation	Structured schedule will be developed

Dependent Variables		Measurement
1	Different components of diversified farming systems	Structured schedule will be developed
2	Level of awareness/adoption	Scale developed by Segnon *et al.*, 2015
3	Level of impact on livelihood status (human, social, physical and financial)	Scale developed by Department of International Development (1999)
4.	Level of impact on farm output	Structured schedule will be developed
5.	Advantages/Constraints associated with Diversified Farming Systems	Structured schedule will be developed

3.3 Techniques of data collection:

A pilot study will be conducted among some of the respondents from non-sampling areas to check the reliability of the schedule. Based on the information received in the pilot study, the schedule will be modified and finalized to conduct the survey.

Primary data will be collected directly from the sampled respondents with the help of structured schedule. Personal interview method will be resorted for data collection from the respondents.. Secondary data will be collected from published sources and relevant Government departments and other reliable sources.

3.4 Statistical tools and analysis: Data collected for the study will be arranged, coded and analyzed through the use of Statistical Package for the Social Sciences (SPSS) computer programme. The statistical measures which will be employed for interpretation of data are mentioned as under: i) Percentage, ii) Mean Score, iii) Standard Deviation, iv) Coefficient of Variation, v) Rank Order, vi) Score Gap, vii) Coefficient of Correlation, viii) Regression ix) Tests of significance will be employed as per the objectives of the study, etc.

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